compared to 19% (CI_{95} 11.8, 26.1%) ($P < .0001$) for those who did not have LI at 1 month post- AlloHSCT. On multivariate analysis, only bloodstream bacterial infections ($P = .0059$) and invasive fungal infections ($P = .0020$) were significant risk factors for developing LI at 1 month. On multivariate analysis for risk factors for TRM, only LI at 1 month post-AlloHSCT ($P = .0001$), primary graft failure ($P = .0096$) and bloodstream bacterial infections ($P = .0328$) were significant. However, LI prior to AlloHSCT conditioning was not associated with higher TRM.

Conclusions: TRM among pediatric patients with LI at 1 month post-AlloHSCT is extremely high, with infections being the primary risk factor for LI.

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The Safety and Tolerability of the Novel Therakos Cellex Machine for Extracorporeal Photopheresis in the Treatment of GVHD in Children

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Extracorporeal photopheresis (ECP) is an established second line treatment option for graft versus host disease post hematopoietic progenitor cell transplant. At our center the Therakos Cellex has replaced the UVAR-XTS machine for ECP since 2009. We reviewed the records of 385 procedures using the Therakos Cellex. Nine patients underwent ECP for GVHD. The median age was 13.5 years (range 3.7 to 24) and weight was 49.2 kg (range 18.5-86.3). ECP was initiated at a median of 7.5 months (range 0.3-34.8) from the onset of GVHD. The mean duration per procedure was 106 minutes (range 60-205). Fifteen (3.9%) procedures were cancelled and 10 (2.6%) were delayed with central venous line (CVL) issues being the most frequent problem. Instillation of prophylactic tissue plasminogen activator (tPA) in the CVL lumens prior to a procedure was instituted 6 months before the end of study period, to reduce the incidence of CVL related occlusions and sluggish returns. With change in practice, fewer CVL related occlusions were observed (4.7% vs. 2.3%). There was one episode of CVL-associated thrombosis and one episode of delayed bleeding (mild and spontaneously resolved). There were four episodes of viral reactivation, 4 CVL-associated infections (1142 catheter days) and 1 episode of systemic inflammatory response syndrome. No patient experienced hypotension that required medical intervention. Although no additional adverse events were noted, there was considerable blood exposure in the smallest patients because of the need for machine blood prime. The Therakos Cellex appears to be safe and well-tolerated in 385 procedures performed in our institution. This is the first report regarding the safety and tolerability of this device for ECP in children and young adults.

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CNS Disease at Diagnosis May Predict Relapse of Hematologic Malignancies in Pediatric Patients After Allogeneic Hematopoietic Cell Transplantation (AlloHCT)

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Background: Relapse is the primary cause of treatment failure post alloHCT. We sought to identify risk factors that predict relapse of hematologic malignancies after allogeneic hematopoietic cell transplantation (alloHCT) to identify those at highest risk of relapse who may benefit from novel therapies.

Design: This was a single institution, retrospective cohort study of children with acute lymphoblastic leukemia (ALL), acute myelogenous leukemia (AML), mixed phenotypic acute leukemia (MPAL) and myelodysplastic syndrome (MDS) who had undergone alloHCT between 1/1/2003 and 12/31/2010. Relapse was defined as any evidence of increasing disease post-alloHCT, including minimal residual disease (MRD). Relapse-free survival (RFS) was estimated by the Kaplan-Meier method and the log-rank test used to assess univariate associations with various characteristics. A Cox proportional hazards model was used to identify factors jointly associated with RFS.

Results: Of 70 children who underwent a myeloablative HCT for MDS or acute leukemia in complete remission at the time of HCT, 24 (34%) relapsed at a median of 214 days (range 1 month- 57 months) post-HCT. Relapse rates by disease were 14/31 (45%) for ALL; 7/26 (27%) for AML; 3/9 (33%) for MPAL; 0/4 (0%) for MDS. Univariate analysis demonstrated that black race, central nervous system (CNS) disease at diagnosis (Figure 1), greater number of regimens given to induce remission and MRD pre-HCT were associated with higher relapse probability. In a Cox model, either two or more regimens needed to achieve remission or the presence of both pre-HCT MRD and CNS disease were approximately equally predictive of increased relapse risk. In patients with ALL, CNS disease was more highly associated with relapse risk than MRD. For those who were MRD negative, based on 19 total patients, the presence of CNS disease at diagnosis (n=2) was significantly associated with higher relapse risk ($P < .0001$).

Conclusion: We identified CNS involvement at diagnosis as a novel risk factor associated with relapse risk after alloHCT. This may be due to inherent biologic differences leading to higher risk disease, or as a sanctuary site, the CNS may be less amenable to an allogeneic effect. These patients may benefit from earlier or more intensive CNS-directed therapy to reduce relapse risk. Validation of these risk factors in a larger population and development of a prognostic score to identify those at highest risk of relapse in addition to a biology study to evaluate for MRD in the CNS using flow cytometery is planned. The goal is for prospective use of this prognostic tool in the development of relapse prevention trials.

Table 1
Relapse rates, by MRD

Disease	MRD ≥0.01%	Total (n)	Relapse (n)	Relapse Rates
Acute lymphoblastic leukemia	No	20	7	35%
	Yes	11	7	64%
Acute myelogenous leukemia	No	15	3	20%
	Yes	11	4	36%
Mixed phenotype acute leukemia	No	8	3	38%
	Yes	1	0	0%